

REMARKS

Careful consideration has been given by the applicants to the Examiner's comments and rejection of the claims, as set forth in the outstanding Office Action, and favorable reconsideration and allowance of the application, as amended, is earnestly solicited.

Applicants note the Examiner's rejection of Claims 1 and 3-10 under 35 U.S.C. §103(a) as being unpatentable by Applicants' acknowledged state of the art, or Nels in view of Winckler, as extensively detailed in the Office Action.

However, upon careful consideration of the art, as cited by the Examiner, and also the current state of the art, as described in the present specification, applicants respectfully submit that the claims, as pending and as presented herein, clearly and unambiguously present patentable subject matter.

Concerning the extensive comments presented by the Examiner with regard to the current state of the technology, applicants respectfully take issue with the Examiner's position that the present structure of the synchronizer ring would be an obvious expedient for one of skill in the art. However, applicants respectfully take issue with the Examiner indicating, to the contrary, that no one in the technology, until presently developed by the present applicants, has constructed a synchronizer ring with a friction layer in a manner and structure as claimed and disclosed herein, although the need for providing such a friction layer was already clearly evident in the technology.

The reason why quite apparently, the technology did not develop the synchronizer rings with the friction layers analogous to the present invention was predicated on the number of contradictory opinions among experts in this field. On the one hand, it was and is known in the technology that a compacted friction layer enables oil to disappear or to be withdrawn from the

friction surface into the confines of the function layer. However, such compacted friction layers were normally provided with oil channels in order to afford a capability for oil being removed or withdrawn from the friction surface and drained away through the channels. On the other hand, in the technology it has been and is known to utilize the concept that porous friction layers, which are able to absorb oil and which, thus, free or eliminate the friction surface from the presence of any oil thereon, are extensively compressible. However, a high degree of compressibility of a friction layer of that type is not suited for synchronizer rings, inasmuch as in order to be able to provide a precise functioning of synchronizer rings, it is extremely important to be able to afford the presence of a precise degree of physical geometry to meet the working conditions which are present in a gearbox. Thus, a friction layer which does not evidence a deformation resistance due to a high degree of compressibility, will adversely influence the precision and efficacy of the working characteristics or behavior of the synchronizer ring, and ultimately, adversely affecting the utilization thereof, while reducing the operating service life of such a synchronizer ring.

Contrastingly with the foregoing, a synchronizer ring possessing a friction layer having the structure and characteristics as claimed herein, provides for unexpected and highly advantageous physical properties. Thus, on the one hand, there is provided a sufficiently porous structure, which enables oil to be removed or withdrawn from the friction surface, whereas, on the other hand, there is attained a high resistance to any extensive deformation which enables the synchronizer ring to be imparted a precise and long lasting geometry of the friction layer. Consequently, in view of the high quality degree of functioning and reliability, in addition to the inventive structure facilitating a lengthy service life for the synchronizer ring, this provides an important technological advantage in contrast with the prior art.

Moreover, until the present applicants developed the synchronizer ring with the structures and features, as described and claimed herein, the industry did not have any knowledge of friction layer material synchronizer rings which evidence a resistance to deformation during the synchronizing process, and, consequently, only short service lives were carried out and expected for the synchronizer rings with friction layers. Consequently, the present invention meets a need in the technology that has existed since highly sophisticated and high performance motorized vehicles have been marketed inasmuch as synchronizer rings employed in the gearboxes of such high performance motorized vehicles must withstand higher levels of friction, and consequently, are subjected to a hard wear which imposes further demands thereon.

In contrast with clutches where friction surfaces represent planar surface structures, the friction surface of a synchronizer ring is inclined or conically tapered and requires an extremely high precision in both manufacture and operation. The working precision of a synchronizer ring is required to be at least ten times as high in its requirements than is the precision of a planar clutch. Consequently, an important precision requirement for synchronizer rings resides in that it is extremely detrimental if a friction layer of a synchronizer ring is excessively compressible and, thus, would not evidence any sufficiently high resistance to deformation.

Reverting to the art, applicants submit the following comments in traverse thereof:

With regard to Nels, U.S. Patent No. 6,065,579, this discloses a synchronizer ring that is subjected to the disadvantages in having to provide grooves or channels to enable fluids to pass therethrough. The interior conical surface, which provides for a friction layer, does not incorporate the features of the present invention, nor the types of materials and treatment leading to the ultimate compressive resistance friction layer possessing the advantageous properties, as fully described throughout the specification.

More importantly, with regard to the present invention, Winckler, U.S. Patent No. 4,700,823 provides for a carbon friction material utilized for a clutch.

However, as previously stressed by the applicants, Winckler does not disclose any mechanically densified or compacted material, but only seals the surface of a carbon layer without any mechanical compression. This aspect is clearly set forth in Winckler's Claim 1, "coating of carbon is deposited on said fibers by Chemical Vapor Deposition --- (the carbon) material having a relatively open mesh with the discernable surface texture --- being substantially the same after coating is applied". This clearly evidences that there is no mechanical densification or compaction while that is further confirmed in Winckler's Claim 4, wherein it is specifically stated "further, this material is flexible". In contrast with Winckler, the material provided for by the present invention, as claimed, is relatively rigid, and which also is set forth on Page 8, line 20 of the present specification.

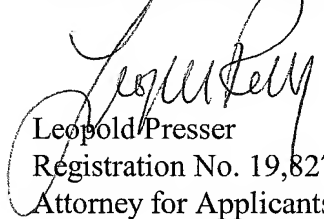
Moreover, Winckler also evidences that the only sealing is provided for the surface of the carbon friction material, since at Column 4, lines 51-56, states "pyrolytic carbon deposited on the fibers by Chemical Vapor Deposition --- friction material having a relatively open mesh". This cannot be considered a densified material that has been mechanically compacted, as is the case in the present invention, so as to provide the ultimate required properties for the friction layer.

Consequently, none of the prior art publications known to applicants, either that considered in the state of the art, nor the references cited by the Examiner are in any manner applicable to the synchronizer ring structure and friction layer, as applied to the metal body.

Accordingly, the newly presented main Claim 11 and the claims which are dependent therefrom, are clearly and unambiguously directed to novel aspects, which in no manner can be either ascertained from nor suggested by the references or record, and in view of which the early and favorable reconsideration and allowance of the application by the Examiner is earnestly solicited.

However, in the event that the Examiner has any queries concerning the instantly submitted Amendment, applicants' attorney respectfully requests that he be accorded the courtesy of possibly a telephone conference to discuss any matters in need of attention.

Respectfully submitted,



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